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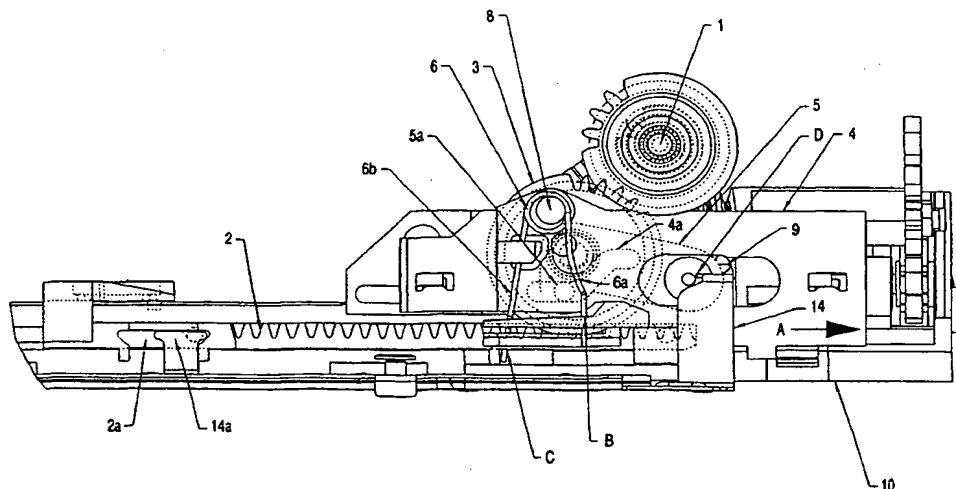
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**Published**

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(54) Title: CHANGING GEAR



## (57) Abstract

The invention relates to a device for playing and storing several disc-shaped data carriers for alternate operation, in particular CDs, CD-ROMs, and DVDs, with a playback unit serving for playing the data carrier and comprising substantially a base plate, a frame plate, and springs and dampers arranged therebetween, and a turntable arranged on the frame plate for accommodating the data carrier and a tensioning device for the data carrier, as well as a stacking unit for the intermediate storage of several data carriers and a loading unit for the bidirectional transport of the data carrier between the stacking unit and the playback unit and for moving the data carrier into and out of the device. A changing gear is provided which has two alternative outputs, the first output (2) being provided inter alia for the purpose of adjusting a control member (14) which can be displaced from an extreme position of the first output (2) by means of a further drive, such that an adjustment member (4) carries out the switching-over operation.

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Changing gear.

The invention relates to a device for playing and storing several disc-shaped data carriers with changing facility, in particular CDs, CD-ROMs, and DVDs, with a playback unit designed for playing the data carrier and consisting substantially of a base plate, a frame plate, and springs and dampers arranged therebetween, a turntable arranged on  
5 the frame plate and supporting the data carrier, and a tensioning device for the data carrier, with a stacking unit serving for the intermediate storage of several data carriers and a loading unit serving for the bidirectional transport of the data carrier between the stacking unit and the playback unit as well as for moving the data carrier into and out of the device.

The present state of the art provides that an individual motor is used for each  
10 of these mechanisms, or a changing gear is adjusted by hand or by means of a separate, small servomotor such that the motor power of a motor is switched over to various drives. The use of a separate drive motor or a servomotor is expensive, and a gear switch by hand is not always practicable or is at the very least uncomfortable. It happens in many technical appliances that several different mechanisms are used which must not be operated  
15 simultaneously.

It is an object of the invention to construct a drive system which controls itself without the help of servo drives such that the drive of two different mechanisms is rendered possible with only one motor.

The object according to the invention is achieved in that a changing gear is  
20 provided which has two alternate drive outputs, the first drive output being designed inter alia for the function of adjusting a control member which can be moved further from an extreme position of the first drive output by means of a further drive, with the result that an adjustment member carries out the switching-over operation.

The advantage lies in the fact that it is possible to control two drive outputs by  
25 means of only one motor drive via the changing gear, the switch-over between the two drive outputs taking place automatically by means of the adjustment member, and a manual operation is unnecessary.

In an embodiment of the device according to the invention, a changing wheel which is rotatably journaled about a drive wheel on a pivoting lever can be adjusted by means

of an adjustment member which is kept in or brought into a first end position by a spring, as a result of which the first output side of the changing gear is in engagement.

Advantageously, the drive wheel and the changing wheel are thus in continuous contact, and a mechanically simple, slide-type adjustment member suffices for transmitting the drive force to the one drive output and to the other drive output alternately. The spring ensures in this case that the changing wheel is brought into the first end position and is retained there.

It is furthermore provided that the spring is constructed as a leg spring whose second leg is supported against a frame, whose turn or turns is/are supported on a mandrel of the adjustment member, and whose first leg in said first end position is also supported against the adjustment member, such that the spring force acts with displacement effect on the adjustment member from the second leg only, while the adjustment member for the purpose of coupling the second output side of the changing gear by means of a control element, which acts on the first leg of the spring and compensates the contact force thereof on the adjustment member, changes the balance of forces such that the spring force between the control element and the adjustment member becomes greater than the spring force on the second leg and the frame, with the result that the adjustment member moves towards the second end position until the second end position is reached, whereby the movement of the adjustment member is blocked, whereas the first leg of the spring is displaced further by the control element and is thus lifted at one point from the adjustment member.

The automatic switch-over from the first to the second operating mode takes place automatically owing to this advantageous embodiment. This automatic switch-over takes place exactly the moment the spring force between the control element and the adjustment member becomes greater than the force of the second spring leg exerted on the frame. The increase in the spring force between the control element and the adjustment member is achieved in a suitable manner through the movement of a component controlled by the first drive output side.

It is furthermore provided that the coupling region between the first output member and the control member is constructed such that the first output member and the control member can move relative to one another in the direction of movement of the control member, and this clearance space is utilized for coupling and uncoupling the first drive output side.

The coupling region as provided here has the advantage that a simple coupling and uncoupling of the first output can take place without a complicated coupling between the drive member and the first output being necessary.

It is provided in a further embodiment of the invention that a changing gear is  
5 fitted with the features according to the invention as mentioned above.

An embodiment of the invention will be explained in more detail below with reference to the drawings, in which:

10 Fig. 1 shows a changing gear in plan view;  
Fig. 2 shows the changing gear in a further plan view;  
Fig. 3 is a three-dimensional picture of the changing gear; and  
Fig. 4 is a three-dimensional picture of a lever mechanism with a control  
element.

15

The operation of a changing gear according to the invention will be explained below. Fig. 1 shows the changing gear with a first output member 2, a second output member 1, a changing wheel 3, an adjustment member 4, and a control element 7 in a position in  
20 which the first output is driven. The changing wheel 3 is rotatably journaled on a pivot lever 5 and is in engagement with the rack 2 of the second output side. The pivot lever 5 can be pivoted by means of its catch pin 5a and the contour 4a of the adjustment member 4 when the adjustment member 4 is displaced against the direction of arrow A, so that the changing wheel 3 can be brought into engagement with the drive wheel 1 of the second output side.  
25 This situation is visible in Fig. 2.

The first leg 6a of the spring 6 bears on the adjustment member 4 in point B, and the second leg 6b bears on the frame 10 in point C, so that the adjustment member 4 is forced in the direction of the arrow A. The turn of the spring 6 is retained on the adjustment member 4 by a mandrel 8. The control element 14 lies in front of the first leg 6a of the spring.  
30 The control element 14 is coupled to the rack 2 by means of its dog 14a which lies in a rack opening 2a. In this switching position of the changing gear, a displacement of the rack 2 in a direction opposed to the arrow A has the result that the control element 14 will follow this movement, so that the edge D thereof approaches the first leg 6a and finally touches it. This is the extreme position up to which the rack 2 in its function as an output member can be

displaced. A further displacement of the control element 14 in a direction opposite to the arrow A is only possible if the width of the rack opening 2a of the rack 2 is greater than the width of the dog 14a, since a displacement of the rack 2 with the changing wheel 3 coupled thereto is not possible. Fig. 3 accordingly shows the changing gear in the first output position with the control element 14 and the dog 14a thereof coupled to the first output member 2, i.e. in the rack opening 2a thereof.

The displacement of the control element 14 against the arrow A has the result that the edge D of the element will occupy a position between the turn of the spring 6 and the point C on the first leg 6a of the spring. Since the effective lever arms on the spring legs 6a and 6b are of different lengths, the force between the control element 14 and the first leg 6a of the spring 6 is greater than the force between the second leg 6b and the frame point C. When the control element 14 is moved further, the turn of the spring 6, and accordingly also the adjustment member 4, will follow the movement of the control element 14 until the movement of the adjustment member 4 is stopped by an abutment. When the control element 14 moves still further after that, the first leg 6a will lift itself off its contact point B on the adjustment member 4 and will bear on the abutment with prestress. The switch-over process from the first output to the second output is completed thereby. Fig. 4 separately shows the lever mechanism with the control element 14, which is coupled by its dog 14a into the first output member 2 (not shown), and with a component of the third mechanism 5, by means of whose carrier block T2 the control element 14 can be operated by its catch T1 for switching the changing gear over.

## CLAIMS:

1. A device for playing and storing several disc-shaped data carriers with changing facility, in particular CDs, CD-ROMs, and DVDs, with a playback unit designed for playing the data carrier and consisting substantially of a base plate, a frame plate, and springs and dampers arranged therebetween, a turntable arranged on the frame plate and supporting the data carrier, and a tensioning device for the data carrier, with a stacking unit serving for the intermediate storage of several data carriers and a loading unit serving for the bidirectional transport of the data carrier between the stacking unit and the playback unit as well as for moving the data carrier into and out of the device, characterized in that a changing gear is provided which has two alternate drive outputs, the first drive output (2) being designed inter alia for the function of adjusting a control member (14) which can be moved further from an extreme position of the first drive output (2) by means of a further drive, with the result that an adjustment member (4) carries out the switching-over operation.
2. A device as claimed in claim 1, characterized in that a changing wheel (3) which is rotatably journaled about a drive wheel (9) on a pivoting lever (5) can be adjusted by means of an adjustment member (4) which is kept in or brought into a first end position by a spring (6), as a result of which the first output side (2) of the changing gear is in engagement.
3. A device as claimed in one of the claims 1 and 2, characterized in that the spring (6) is constructed as a leg spring whose second leg (6b) is supported against a frame (10), whose turn or turns is/are supported on a mandrel (8) of the adjustment member (4), and whose first leg (6a) in said first end position is also supported against the adjustment member (4), such that the spring force acts with displacement effect on the adjustment member (4) from the second leg (6b) only, while the adjustment member (4) for the purpose of coupling the second output side of the changing gear by means of a control element (14), which acts on the first leg (6a) of the spring (6) and compensates the contact force thereof on the adjustment member (4), changes the balance of forces such that the spring force between the

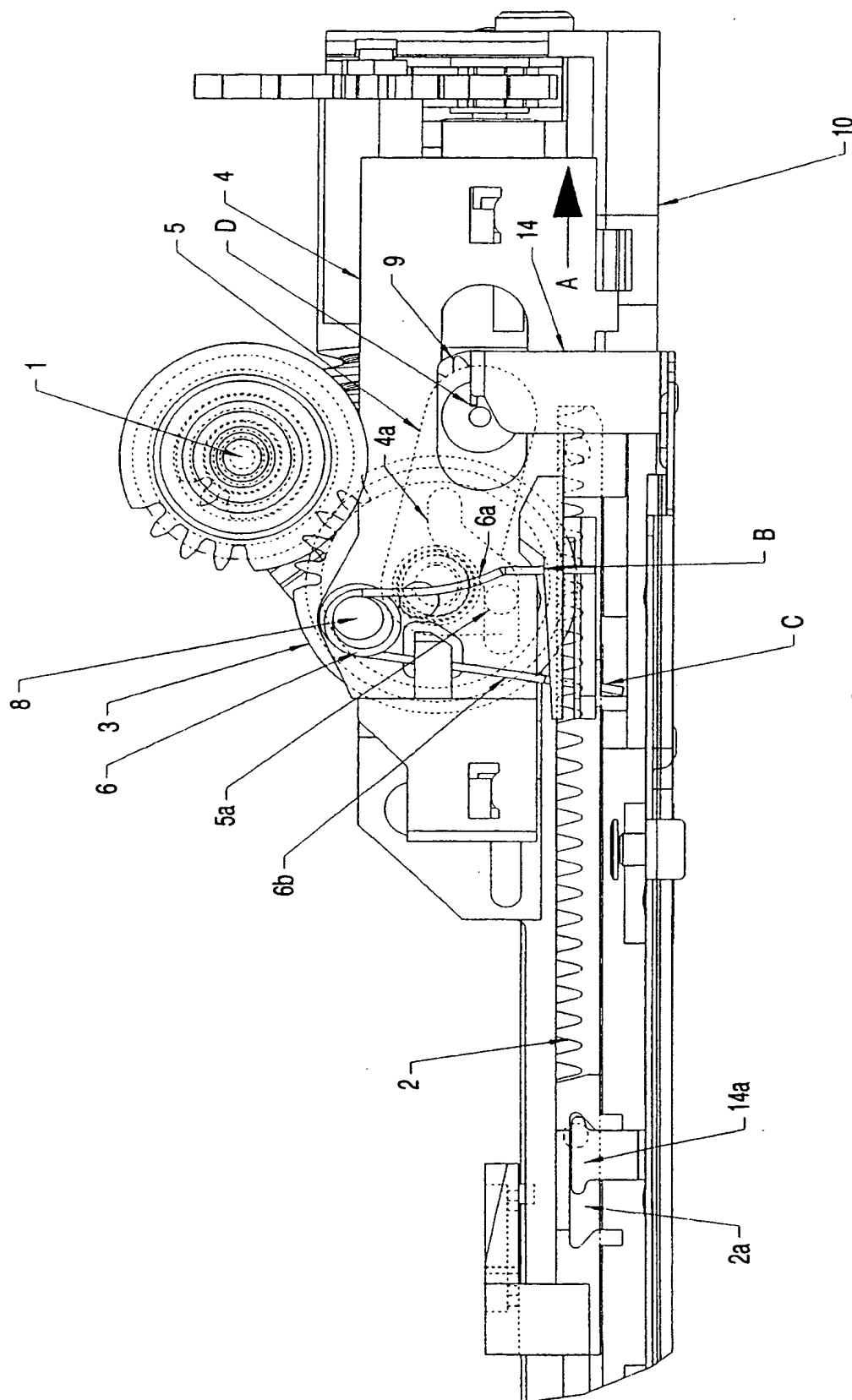
control element (14) and the adjustment member (4) becomes greater than the spring force on the second leg (6b) and the frame (10), with the result that the adjustment member (4) moves towards the second end position until the second end position is reached, whereby the movement of the adjustment member (4) is blocked, whereas the first leg (6a) of the spring  
5 (6) is displaced further by the control element (14) and is thus lifted off the adjustment member (4) at point B.

4. A device as claimed in any one of the claims 1 to 3, characterized in that the coupling region between the first output member (2) and the control member (14) is  
10 constructed such that the first output member (2) and the control member (14) can move relative to one another in the direction of movement of the control member (14), and the resulting clearance space is utilized for coupling and uncoupling the first drive output side (2).

15 5. A changing gear, in particular for a device for playing and storing several disc-shaped data carriers, characterized in that said changing gear has two alternate drive outputs, the first drive output (2) being designed inter alia for the function of adjusting a control member (14) which can be moved further from an extreme position of the first drive output (2) by means of a further drive, with the result that an adjustment member (4) carries out the  
20 switching-over operation.



1/4



2/4

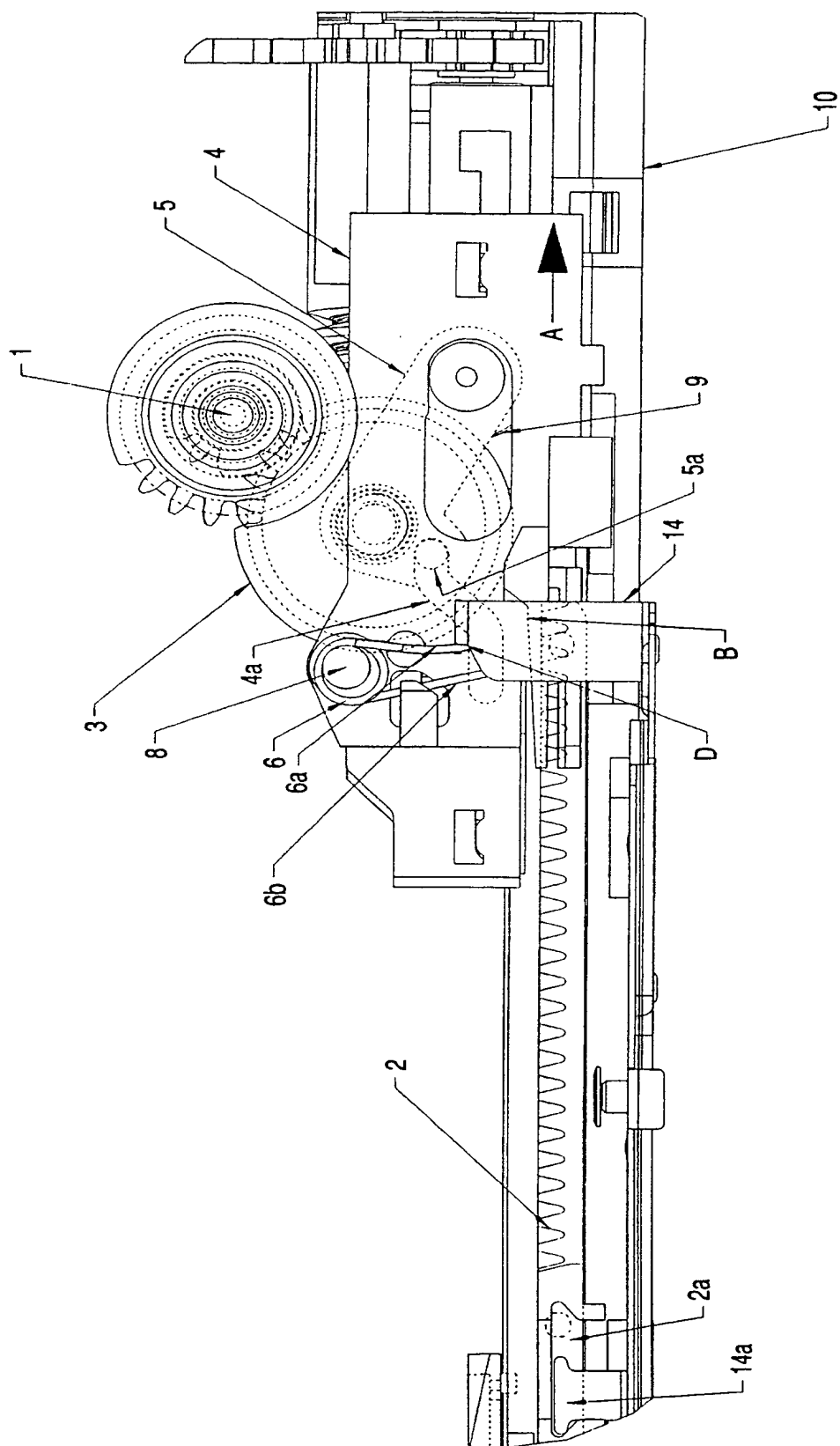


FIG. 2

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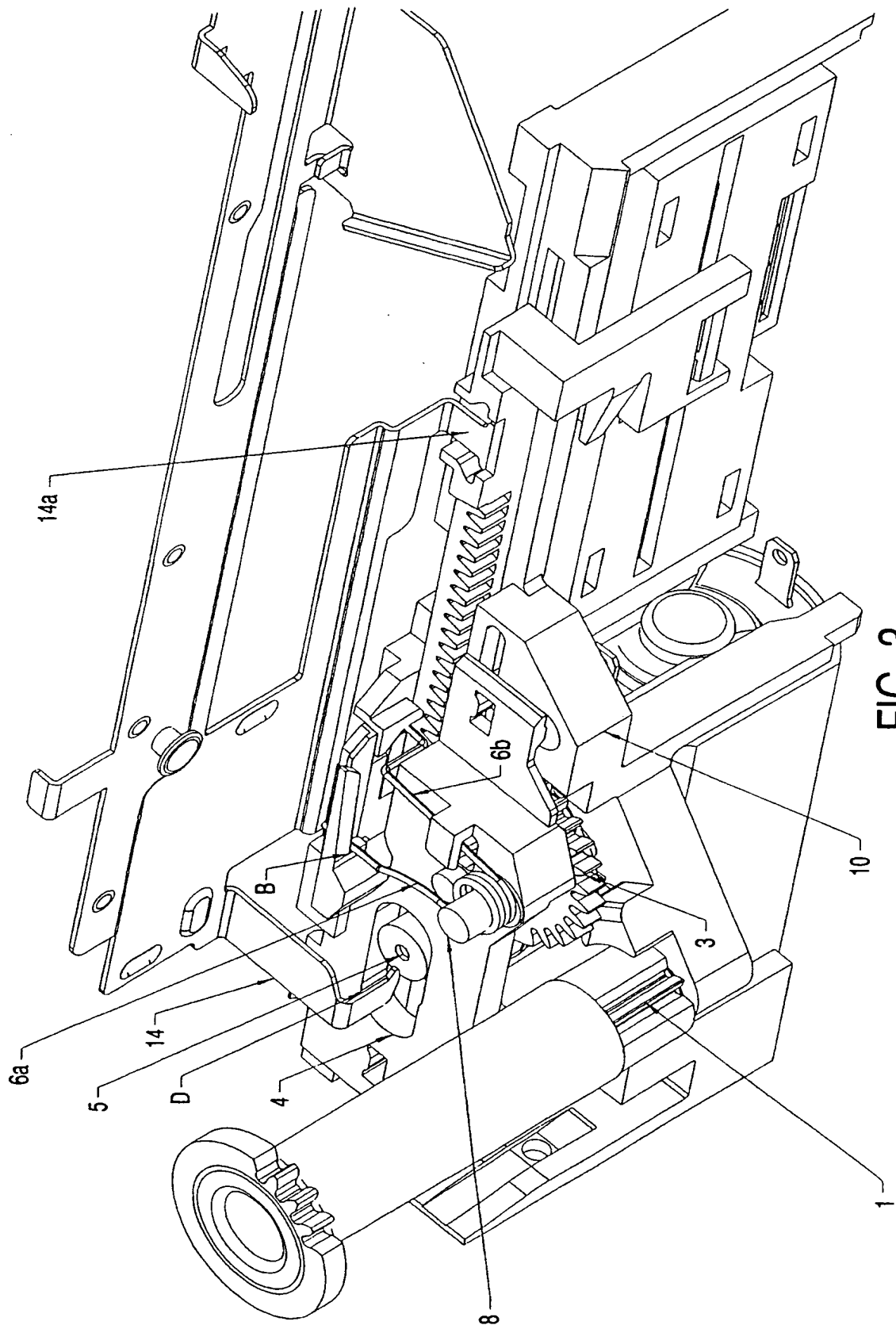
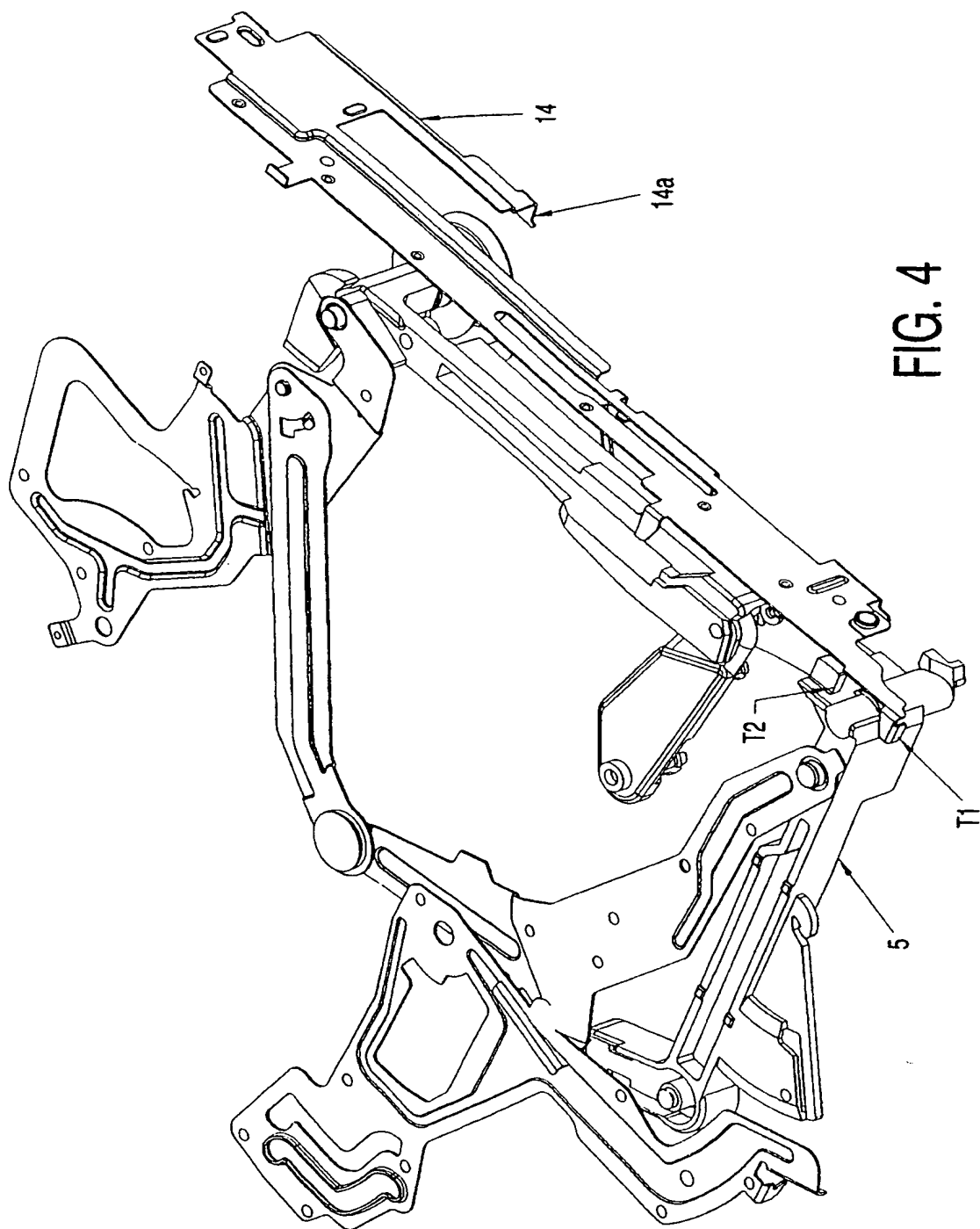


FIG. 3



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/02178

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 G11B17/22 G11B17/04

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G11B F16H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category * | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|------------|---|-----------------------|
| X          | US 5 313 351 A (LEE CHUNG-GEU)<br>17 May 1994 (1994-05-17)  | 1,5                   |
| A          | column 2, line 66 -column 4, line 2<br>---  | 2-4                   |
| X,P        | EP 0 926 667 A (CLARION CO LTD)<br>30 June 1999 (1999-06-30)<br>column 14, line 39 -column 17, line 32;<br>figures 1-6<br>---                         | 1,5                   |
| X,P        | EP 0 905 688 A (MATSUSHITA ELECTRIC IND CO LTD)<br>31 March 1999 (1999-03-31)<br>column 15, line 20 -column 18, line 8;<br>figures 2,5,8,14-17<br>--- | 1,5                   |
| A          | EP 0 332 171 A (SANYO ELECTRIC CO)<br>13 September 1989 (1989-09-13)<br>abstract<br>-----   | 1-5                   |



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9 June 2000

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Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

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|---|---------------------|---|--|
| US 5313351 A                              | 17-05-1994          | KR 9107430 B<br>DE 3943332 A<br>GB 2256739 A,B<br>JP 2512574 B<br>JP 3008188 A                                | 26-09-1991<br>13-12-1990<br>16-12-1992<br>03-07-1996<br>16-01-1991                             |
| EP 0926667 A                              | 30-06-1999          | JP 11195262 A   | 21-07-1999   |
| EP 0905688 A                              | 31-03-1999          | JP 11102563 A<br>CN 1213134 A   | 13-04-1999<br>07-04-1999   |
| EP 0332171 A                              | 13-09-1989          | JP 1227284 A<br>JP 2573017 B<br>CA 1319429 A<br>DE 68923983 D<br>DE 68923983 T<br>KR 147065 B<br>US 5119357 A | 11-09-1989<br>16-01-1997<br>22-06-1993<br>05-10-1995<br>13-06-1996<br>15-10-1998<br>02-06-1992 |

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## INTERNATIONAL SEARCH REPORT

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| Applicant's or agent's file reference<br><b>PHD 99.027W0</b> | <b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below. |  |
| International application No.<br><b>PCT/EP 00/ 02178</b>     | International filing date (day/month/year)<br><b>10/03/2000</b>   | (Earliest) Priority Date (day/month/year)<br><b>11/03/1999</b> |
| Applicant<br><br><b>KONINKLIJKE PHILIPS ELECTRONICS N.V.</b> |   |  |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

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### 1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

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2. ☐ **Certain claims were found unsearchable** (See Box I).

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1  
☐ None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/02178

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G11B17/22 G11B17/04

According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G11B F16H

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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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Date of the actual completion of the international search

9 June 2000

Date of mailing of the international search report

21/06/2000

Name and mailing address of the ISA

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Fax: (+31-70) 340-3016

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Sozzi, R



# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 00/02178

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
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|   |   |                     | US 5119357 A               | 02-06-1992          |
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